

# 2004 GALVESTON BAY INVASIVE SPECIES RISK ASSESSMENT

## INVASIVE SPECIES SUMMARY

Created by: Environmental Institute of Houston, University of Houston-Clear Lake  
and the Houston Advanced Research Center

<b>Common Name:</b> Tropical soda apple			
<b>Latin Name:</b> <i>Solanum viarum</i>			
<b>Category:</b> Terrestrial Plant			
<b>Place of Origin:</b> Argentina and Brazil			
<b>Place of Introduction:</b> Glades County, Florida <a href="http://www.ceris.purdue.edu/napis/pests/tsa/pausda1.html">http://www.ceris.purdue.edu/napis/pests/tsa/pausda1.html</a>			
<b>Date of Introduction:</b> “The first known collection of tropical soda apple in the U.S. was from Glades County, Florida, in 1988, but it may have been present in the state as early as 1981 or 1982 (4).” <a href="http://www.ceris.purdue.edu/napis/pests/tsa/pausda1.html">http://www.ceris.purdue.edu/napis/pests/tsa/pausda1.html</a>			
<b>States Effected:</b>			
Alabama	Georgia	North Carolina	South Carolina
Florida	Mississippi	Pennsylvania	Tennessee
<a href="http://plants.usda.gov/cgi_bin/plant_profile.cgi?symbol=SOVI2">http://plants.usda.gov/cgi_bin/plant_profile.cgi?symbol=SOVI2</a>			
<b>Growth/Size:</b> <p>“The primary means of dispersal of tropical soda apple in the U.S. is livestock and wildlife, such as raccoons, deer, feral hogs and birds feeding on fruits (4, 5). Mullahey, et al. (5) reported that tropical soda apple foliage is unpalatable to livestock although cattle will eat the mature fruit. Scarification of seeds by digestive systems of livestock and wildlife seems to promote seed germination. Intra- and inter-county and state movement of livestock that have recently fed on tropical soda apple fruit are the primary vectors for its spread (2). However, contaminated equipment, hay, seed, composted manure and sod may also serve as a means of dispersal. Once established in an area, wildlife may continue the spread of tropical soda apple.... Each plant is capable of producing 200 or more fruit per year (7).” <a href="http://www.ceris.purdue.edu/napis/pests/tsa/pausda1.html">http://www.ceris.purdue.edu/napis/pests/tsa/pausda1.html</a> (Accessed 24 March 2003).</p> <p>“At maturity, TSA is 3 to 6 feet tall and the entire plant, including stems and leaves, has thorn-like prickles approximately 0.5 to 1 inch long (see <a href="#">Plate 3</a>). Leaves are pubescent (hairy); measure 6 to 8 inches long and 3 to 6 inches wide; and are lobed (see <a href="#">Plate 4</a>). The flowers are white with yellow stamens. The globular fruit, approximately 1 inch in diameter, is yellow when mature (see <a href="#">Plate 2</a>). Each mature fruit contains about 400 light red-brown seeds with diameters of approximately 0.10 inch. Seeds are only moderately flattened and are found in a mucilaginous layer containing a glycoalkaloid called solasodine. TSA fruit collected in south Florida averaged 1 inch in diameter, with an average of 413 seeds per fruit.” <a href="http://edis.ifas.ufl.edu/scripts/htmlgen.exe?DOCUMENT_UW097">http://edis.ifas.ufl.edu/scripts/htmlgen.exe?DOCUMENT_UW097</a> (Accessed 24 March 2003).</p>			
<b>Habitat:</b> <p>“TSA has been observed as a weed in pastures, ditch banks, sod fields, citrus groves, sugar cane fields, vegetable fields, roadsides, rangeland, and nature preserves.” <a href="http://edis.ifas.ufl.edu/scripts/htmlgen.exe?DOCUMENT_UW097">http://edis.ifas.ufl.edu/scripts/htmlgen.exe?DOCUMENT_UW097</a> (Accessed 24 March 2003).</p>			
<b>Attitude (aggressive, etc.):</b> <p>“Tropical soda apple is a threat to the vegetable crop industry as a competitive weed and because it is an alternate host for numerous pathogens that are diseases of eggplant, peppers, potatoes, tomatoes, etc. These vegetable crop pathogens include the cucumber mosaic virus, gemini virus, potato leafroll virus, potato virus Y, tobacco etch virus, tomato mosaic virus, tomato mottle virus, and the fungal pathogen, <i>Alternaria solani</i> (3, 9). ...Since its introduction into the U.S., tropical soda apple has spread rapidly, and currently infests an estimated one million acres of improved pastures, citrus groves, sugar cane fields, ditches, vegetable crops, sod farms, forestlands (oak hammocks and cyprus heads), natural areas, etc. in Alabama, Florida, Georgia and Mississippi (6). Because of its rapid population explosion in Florida and the concerns of livestock producers, tropical soda apple was placed on the Florida Noxious Weed List in late February, 1994 and was placed on the Federal Noxious list in 1995.” <a href="http://www.ceris.purdue.edu/napis/pests/tsa/pausda1.html">http://www.ceris.purdue.edu/napis/pests/tsa/pausda1.html</a> (Accessed 24 March 2003).</p>			
<b>Physical Description:</b> <p>“Mature plants of tropical soda apple are 3 to 6 ft. tall and are armed on the leaves, stems, pedicles, petioles and calyxes with broad based white to yellowish thorn-like prickles up to 3/4 inch long (8). Leaves and stems are pubescent; flowers are white with five recurved petals and white to cream-colored stamens that surround the single pistil (4). Immature fruits are mottled whitish to light green and dark green, like a watermelon (7). The mature fruits are smooth, round yellow, and 3/4 to 1 1/4 inches in diameter with a leathery skin surrounding a thin-layered pale green, scented pulp and 180 to 420 flattened, reddish-brown seeds (4, 5).” <a href="http://www.ceris.purdue.edu/napis/pests/tsa/pausda1.html">http://www.ceris.purdue.edu/napis/pests/tsa/pausda1.html</a> (Accessed 24 March 2003).</p>			

**Management Recommendations / Control Strategies:** include references for existing site-specific strategies

“In order to detect and prevent further spread of this pernicious weed in the U.S., the Cooperative Extension Service and the Departments of Agriculture in several states in the Southern U.S. and the U.S. Department of Agriculture-Agricultural Research Service and -Animal and Plant Health Inspection Service have initiated an education and notification campaign on the potential weed problem of tropical soda apple. Early detection is paramount to eliminate the threat of this weed which has the potential to infest millions of acres of pastures, crops, forests and natural areas in the U.S. The best means of control varies according to the population size. Individual plants and small populations of tropical soda apple should be pulled up and burned completely along with all fruit. Larger populations require repeated mowing and/or one or more applications of an effective herbicide. Individuals who find tropical soda apple should contact their county agent or the authors to verify the identity, document the spread, and begin control measures.”  
<http://www.ceris.purdue.edu/napis/pests/tsa/pausda1.html> (Accessed 24 March 2003).

**“Dense Infestations:**

Pastures with dense stands of TSA or areas where it is not practical to spray individual plants should be mowed. Mow plants to a 3-inch stubble height as soon as possible to keep plants from producing fruit and seed.

Repeat mowing when plants reach the flowering stage (50 to 60 days) through April. Fifty to 60 days after the April mowing, when plant regrowth is at the first flower stage (late May to June), spray a herbicide by one of the following application methods:

**Single Application:**

Remedy® at 1.0 quart per acre (1 lb./acre) + 0.10% to 0.25% non ionic surfactant in 40 GPA. Follow-up the broadcast application with spot treatments (see below) for control of escape plants and new plants from seed. Check pastures monthly for 12 months and spray all new TSA seedling plants. *Do not allow plants to produce fruit!*

**Sparse infestations:**

Pastures, vegetable fields, sod fields, hammocks, ditch banks, and road sides with low infestations where each plant needs to be individually sprayed. Mowing these areas is not necessary, instead, spray TSA in these areas for control and to stop additional development of new fruit and seed.

Recommended herbicides for 95 to 100% control are as follows:

**Spot Application:**

Remedy® at 1% solution + 0.10 to 0.25% non-ionic surfactant + color marker.

Roundup® at 3% solution + 0.10 to 0.25% non-ionic surfactant + color marker.

Cover the entire TSA plant with spray to ensure herbicide uptake and maximum control. Allow herbicides to dry on plants 3 to 4 hours before rainfall. Either herbicide may damage some adjacent pasture grass, however, more damage is likely with Roundup®. Use a colored dye with the herbicide solution to avoid spraying the same plant twice, or not spraying a plant at all. Monitor sprayed areas monthly and treat new TSA seedlings. *Do not allow plants to produce fruit!*

Realize that it will take 1 to 3 years to completely control TSA from pastures and encourage your neighbor to control TSA in his pasture. Do not allow the plant to produce seed (i.e., fruit). Continually monitor pastures for this exotic weed and remove it where found. To effectively control TSA, you must control all existing plants in pastures, ditch banks, and hammock areas and permanently stop seed production. Otherwise, this plant will continue to spread on your property and lower your profits. *IFAS is researching methods to control TSA. Efforts to identify effective methods are focused on herbicide application scheduling, herbicide rates, benefits obtained by mowing, and biological control measures. Individuals requiring additional information should contact their county extension offices.”*

[http://edis.ifas.ufl.edu/scripts/htmlgen.exe?DOCUMENT\\_UW097](http://edis.ifas.ufl.edu/scripts/htmlgen.exe?DOCUMENT_UW097) (Accessed 24 March 2003).

**References (includes journals, agency/university reports, and internet links):**

1. NAPIS - <http://www.ceris.purdue.edu/napis/pests/tsa/pausda1.html>
2. IFAS - [http://edis.ifas.ufl.edu/scripts/htmlgen.exe?DOCUMENT\\_UW097](http://edis.ifas.ufl.edu/scripts/htmlgen.exe?DOCUMENT_UW097)

**Available Mapping Information:**

PLANTS - [http://plants.usda.gov/cgi\\_bin/plant\\_profile.cgi?symbol=SOVI2](http://plants.usda.gov/cgi_bin/plant_profile.cgi?symbol=SOVI2)

NAPIS - <http://www.ceris.purdue.edu/napis/pests/tsa/imap/tsa2002.html>